Space Weather Forecast

Issued on Monday, 13 May 2024 at 13:30 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

Please note: On the 14 May between 1500 UTC and 2100 UTC, a significant data outage at NOAA SWPC is expected which will impact most of our observational data feeds and some models. We may receive data intermittently through that period. MOSWOC service will continue on contingency. Alerts and warnings will be sent using alternative data, if available. The planned data outage may be postponed in the event of significant space weather.

Space Weather Forecast Headline: Minor-Moderate Geomagnetic storms possible day 1 (13 May), but risk then easing. Chance of Strong flares continues, mainly day 1-2 (13-14 May), before easing.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: High with a Strong flare observed 12/1626 UTC from the large active region now on the southwest limb, along with numerous Moderate flares. The most notable Moderate flare was at 13/0944 UTC. This large region has continued to show development within its magnetic looping on SDO imagery, but is now on the southwest limb and subsequently hard to assess. Given the history, size and complexity of the spot, this is expected to dominate the solar activity on the disc even as it rotates over the limb. This is despite a total of fourteen sunspots on the disc, as these are all smaller and generally simpler than this one. The main exception is perhaps a small sunspot region in the south-centre which has a very small intermediate spot which has opposite magnetic polarities within it, leading to some slight complexity.

Further faint coronal mass ejections (CMEs) have been produced by the large spot, along with a much more notable CME from the long period Moderate flare on 13/0944 UTC but currently with little imagery. Given the spots location, Earth-directed components are currently considered unlikely.

Solar Wind / Geomagnetic Activity: Ongoing enhancement from the recent CME arrivals continued during the last 24 hours, including perhaps a slight enhancement from the 11/0115 UTC Strong flare CME, however this was much less noticeable than the arrivals over the previous days, perhaps indicated by a brief spell of very strong solar winds of near 1000 km/s at 12/1451 UTC, but with little effect on the magnetic field. Otherwise solar winds speeds gradually and erratically eased from just below 900 km/s to be elevated at 650 km/s. Total Interplanetary magnetic field (IMF), Bt, persisted at Weak to Moderate levels with the north-south component largely negative (southward) but also Weak to Moderate. Brief positive spells occurred, becoming largely weakly positive from 13/0630 UTC. Geomagnetic activity was Unsettled to Active (Kp3-4) but G1-G2 Minor to Moderate storm for a spell (12/2100-0600 UTC).

Energetic Particles / Solar Radiation: The count rate of energetic particles (high energy protons) was initially just above the S1 Minor Radiation storm levels, but soon declined to be mainly below this through the period. An uptick has subsequently occurred since the Moderate flare at 0944 UTC, but currently remains below the S1 level.

Four-Day Space Weather Forecast Summary

Solar Activity: Further isolated Strong class flares are likely day 1-2 (13-14 May) from the large and complex sunspot on the southwest limb, along with occasional Moderate class flares being

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expected.

Solar Wind / Geomagnetic Activity: There are now no Earth-directed CMEs anticipated, however this morning Moderate flare CME is yet to be assessed. Otherwise, ongoing CME enhanced solar winds, along with any slight influence from a small coronal hole, is expected to gradually ease. Activity is expected to be Unsettled to Active at first with an ongoing potential for further G1-G2 Minor-Moderate storms. However this risk declines through day 1-2 (13-14 May) with mainly Quiet to Unsettled conditions expected by day 3 (15 May) along with a slight chance of Active intervals.

Energetic Particles / Solar Radiation: The count rate of energetic particles is likely to continue rising day 1, likely reaching the S1 Minor Radiation storm level, in response to the recent Moderate flare. Further increases are also possible given the occurrence of any significant flares from the large and complex sunspot region.

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Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	**G1 to G2**	Yes	90	25	5	5
Strong	**G3**	No	10	5	1	1
Severe	**G4**	No	1	1	1	1
Extreme	**G5**	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	**R1-R2 M Class**	Yes	95	90	60	40
Very Active	**R3 to R5 X**	Yes	70	70	25	5

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	**≥ S1**	Yes	80	80	50	10
Very Active	**≥ S3 ***	No	15	15	10	1
* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)						

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